INSTRUCTION MANUAL

REGULATED POWER SUPPLIES

MODEL LM

CC PACKAGE

THIS MANUAL APPLIES TO UNITS

BEARING SERIAL NO. PREFIXES A,B

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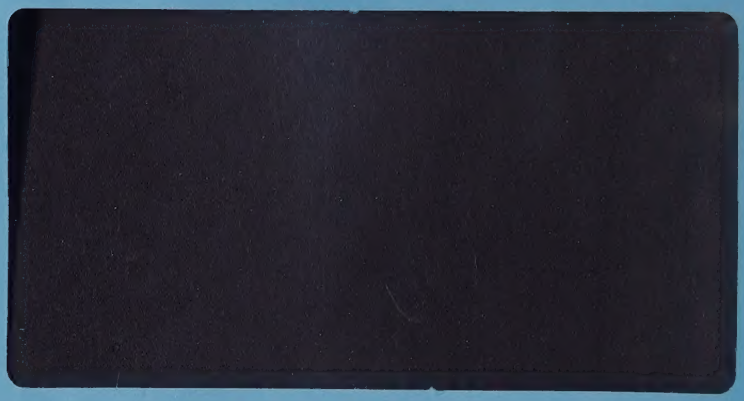

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This manual provides instructions intended for the operation of Lambda power supplies, and is not to be reproduced without the written consent of Lambda Electronics Corp.

LAMBDA ELECTRONICS CORP. MELVILLE, L.I., N.Y.

MAIN PLANT TELEPHONE: 516 MYrtle 4-4200

IM-LMCC

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SPECIFICATIONS AND FEATURES

The following specifications apply for all Lambda CC package LM power supplies. Specification exceptions noted here relate to models incorporating model option "Y" and/or "T". Performance specifications do not change for models with suffix "R", e.g., LM-CC2-R unless the models also include model options "Y" and/or "T", e.g., LM-CC2-YR; for these models the appropriate specification exceptions also apply.

NOTE: Specifications in italics apply only for Lambda models with a "Y" suffix, e.g., LM-CC2-Y. AC INPUT specifications with an asterisk*, applies only for Lambda models with a "T" suffix, e.g., LM-CC2-YT, or a "V" suffix.

DC OUTPUT--Voltage regulated for line and load

Voltage Range.... For voltage range see table I of pertinent model group.

Multi-Current Ratings.... Current ratings specified for each maximum ambient temperature apply over entire output voltage range, with input frequency 55-65 cps. For input frequencies 45-55 at 105-132 VAC or 200-250 VAC, derate maximum current ratings 10% at all ambient temperatures.

For input frequencies 360-440 cps, consult factory for current ratings.

For maximum current ratings at each ambient temperature see table I of pertinent model group.

REGULATED VOLTAGE OUTPUT

Regulation (line).... Less than 0.05 percent plus 4.0 millivolts for input variations from 105-132 or 132-105 volts AC
.... Less than 0.01 percent plus 1.0 millivolt for input variations from 105-132 or 132-105 volts AC

Regulation (load).... Less than 0.03 percent plus 3.0 millivolts for load variations from 0 to full load or full load to 0
.... Less than 0.02 percent plus 2.0 millivolts for load variations from 0 to full load or full load to 0

Remote Programming

External Resistor.... Nominal 200 ohms/volt output

Programming Voltage.... One-to-one voltage change

Ripple and Noise.... One millivolt rms; 3 millivolts peak-to-peak with 60 cps input
.... 0.5 millivolt rms; 3 millivolts peak-to-peak with 60 cps input
.... 1.0 millivolt rms; 10 millivolts peak-to-peak with 400 cps input

Temperature Coefficient.... Change in output voltage less than *0.03%/°C*
.... Change in output voltage less than 0.01%/°C

AC INPUT--105-132 volts AC at 45-440 cps; 225 watts+
+With output loaded to full 40°C rating and input voltage 132 volts at 55-65 cps.
*.... 200-250 volts AC at 45-440 cps ("T" option)
*.... 205-265 volts AC at 45-440 cps ("V" option)

INPUT FUSE--"SLO-BLO" fuse F1 protects the AC input circuit. Overload of the supply does not cause fuse failure.

"SLO-BLO" fuse F2 protects the load from excessive output current that can be caused by internal circuit failure.

For fuse ratings see table I and schematic of pertinent model group.

OVERLOAD PROTECTION

Thermal.... Thermostat resets automatically when overtemperature condition is eliminated

Electrical.... Within rated voltage range, an automatic electronic current-limiting circuit limits output current to approximately 110 percent of 40°C rated current for protection of load and power supply; for overloads approaching short circuit, both voltage and current decrease until at short circuit, current is approximately 30 percent or less of rated current.

OVERSHOOT--No overshoot of output voltage under conditions of power turn-on, power turn-off, or power failure.

INPUT AND OUTPUT CONNECTIONS--Heavy duty terminal block on rear of chassis

OPERATING AMBIENT TEMPERATURE RANGE AND DUTY CYCLE--Continuous duty from -20°C to 71°C ambient with corresponding load current ratings for all modes of operation, and all mounting positions.

STORAGE TEMPERATURE-- -55°C to +85°C

CONTROLS

DC output control.... Voltage adjust control permits adjustment of DC output voltage via access hole located in nameplate.

REMOTE SENSING--Provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation.

PHYSICAL DATA

Size..... 4-15/16" H x 4-15/16" W x 9-3/8" D

Weight ..... 15 lbs. net: 17 lbs. shipping wt.

Finish..... Grey, FED STD 595 No. 26081

MOUNTING--Three surfaces, each with tapped mounting holes, can be utilized for mounting this unit. Refer to figure 9 for mounting details.

ACCESSORIES

Rack Adapters.... Rack adapters LRA-4 and LRA-6, used for ruggedized mounting, with or without chassis slides, are available, as well as rack adapters LRA-3 and LRA-5 which are used for simple rack installations where chassis slides are not required.

Metered and Non-Metered Panels.... Metered panels MP-3, MP-5, and Non-Metered panels P-3, P-5 are available for use with the Lambda rack adapters.

Blank Panels.... Full-rack, half-rack and quarter-rack panels can be used with the Lambda rack adapters. The following chart lists the panels and rack adapters that can be utilized together.

Rack Adapter	BLANK PANELS			Metered/ Non-Metered Panel
	1/2 Rack	1/4 Rack	Full Rack	
LRA 3	LBP-20	LBP-10	LBP-40	MP-5, P-5
LRA 6	LBP-20	LBP-10	LBP-40	MP-5, P-5
LRA 4	LBP-50	LBP-60	LBP-30	MP-3, P-3
LRA 5	LBP-50	LBP-60	LBP-30	MP-3, P-3

Overvoltage Protector.... Externally mounted, Overvoltage Protectors LMOV-1, LMOV-2 and LMOV-3 are available for use with Lambda LM power supplies.

MODEL OPTIONS

Suffix "T" Input Option ....Standard LM power supplies are available for operation with 200-250 volt, 45-440 cps input.

Suffix "Y" High Performance Option....All Lambda LM power supplies are available with high performance specifications. See italicized entries under SPECIFICATIONS AND FEATURES.

Suffix "R" Fungus Proofing Option....Standard LM power supplies can be obtained with fungus proofing treatment with MIL V 173 varnish for all fungi nutrient components.

Suffix "V" Input Option. . . .Standard LM power supplies are available for operation with 205-265 volt, 45-440 cps input.

THEORY OF OPERATION

ENERAL

The Lambda power supply consists of an AC input circuit and transformer; a bias supply consisting of auxiliary rectifier, filter, and a zener diode regulator; and a main regulator circuit consisting of the main ctifier and filter, a series regulator, emitter follower drivers, an error amplifier, a current limit amplifier output voltage sensing circuit and an output current sensing circuit.

The circuit arrangement is shown in block diagram form in figure 7. The circuitry is discussed with ference to the block diagram and the schematic diagram.

UNCTIONAL DESCRIPTION

Single phase input power is applied to transformer T1 through the input circuit containing thermostat , which protects the supply against overheating.

The main rectifier, a full-wave rectifier, provides the power which is filtered by capacitor C8, and en regulated via a series regulator and delivered to the output. Bias supply, half-wave, auxiliary rectifier R7, provides voltage filtered by capacitor C7 and regulated by zener diode CR6 for current limit amplifier Q3 id error amplifier Q1, Q2. Zener diode CR1 and resistor R5, across the bias supply, provide a regulated mperature compensated reference voltage. Resistor R4 compensates for input voltage variations.

Operation of the voltage regulator circuit is determined by changes in the output voltage. A change in .e output voltage is sensed by the sensing divider resistors which compare output voltage with the +S reference oltage. This provides an error voltage at junction of R2 and R3 (or as applicable R1 and R3) which is amplied by error amplifier Q1 and Q2 and is current amplified by drivers Q5, Q6 (and as applicable by drivers 8, Q12). The amplified signal from the drivers controls the voltage across series regulator Q8-Q10, (or, s applicable, by Q8, Q9, or by Q9, Q10), which functions as the active regulating element, restoring itput voltage to the proper level.

Current limit circuit operation is determined by changes in the load. Current limit amplifier Q3 amples load current through current sensing resistor R25A (or as applicable R25). When the voltage drop cross this resistor increases compared with the preset voltage reference determined by R17 and R18, Q3 onducts. Thus, when the output current rating of the unit is exceeded, current limit amplifer Q3 conducts decreasing the current through the drivers, resulting in an increase of voltage across the series regulator and a ecrease of the output voltage, effectively limiting the output current to a safe value. The current limit value s determined by the factory setting of current limit potentiometer R17.

When operating conditions approach short circuit, the output voltage decreases. Since the voltage dermined by R17 and R18 is proportional to the output voltage, when the output voltage decreases, Q3 is biased nto turn-on at lower and lower load currents until output voltage decreases to zero and current decreases to a redetermined low value.

OPERATING INSTRUCTIONS

BASIC MODE OF OPERATION

This power supply operates as a constant voltage source provided the load current does not exceed the rated value at 40°C. For continuous operation, load current must not exceed the rating for each ambient temperature. When load current exceeds 110% of 40°C rating, both voltage and current decrease until voltage reaches zero and the current at short circuit equals approximately 30 percent or less of the rated current.

MOUNTING

When using this unit as a mounted component, a cutout must be provided to permit freeflow of air through the unit. See figure 9 for cutout sizes and specific mounting details.

CONNECTIONS FOR OPERATION

NOTE: Make all connections to the unit before applying AC input power.

Ground Connections. The Lambda power supply can be operated either with negative or positive output terminal grounded. Both positive and negative ground connections are shown in the diagrams for all suggested output connections illustrated in this manual.

Connection Terminals. Make all connections to the supply at the terminal block on the rear of the supply. Apply input power to terminals 1 and 2; always connect the ungrounded (hot) lead to terminal 1.

The supply positive terminal is brought out to terminal 6; the negative terminal to terminal 4.

NOTE: When shipped from the factory, the supply is ready for use as a local-sensing constant voltage source. Jumpers are connected at the factory as shown in figure 3. Take care to remove the appropriate jumpers for load requirements that need different supply-load connections. Refer to the appropriate connection diagram.

Supply-Load Connections. The regulation of the supply at the load may change when connecting leads of practical length are used. To minimize the effect of the output load leads, remote sensing is used. Refer to figure 1 to determine voltage drop for particular cable lengths, wire size and current conditions. Lead lengths must be measured from supply terminals to load terminals as shown in figure 2.

Local-Sensing Connection, See Figure 3.

Remote-Sensing Connection, See Figure 4.

Programmed Voltage Connection Using External Resistor, See Figure 5. Discrete voltage steps can be programmed with a resistance voltage divider valued at nominal 200 ohms/volt output and a shorting-type switch. For continuous voltage variations, use a variable resistor with the same ohms/volt ratio in place of the voltage divider and shorting-type switch. Use low temperature coefficient resistor(s) to assure most stable operation.

Programmed Voltage Connection Using Programming Voltage, See Figure 6. The power supply voltage output can be programmed with an externally connected programming power supply. The output voltage of the programmed supply will maintain a one-to-one ratio with the voltage of the programming supply.

The programming supply must have a reverse current capability of 6 ma. minimum.

Alternatively, when supplies with less than 6 ma. reverse current capability are used, a resistor capable of drawing 6 ma. at the minimum programming voltage must be connected across the output terminals of the supply. This programming supply must be rated to handle all excess resistor current at the maximum programming voltage.

OPERATION AFTER PROTECTIVE DEVICE SHUTDOWN

Thermostat Shutdown. The thermostat opens the input circuit only when the power supply output current exceeds the current rating specified for the operating ambient temperature, causing the unit to overheat. Do not exceed current rating specified for the operating ambient temperature. When the temperature of the unit decreases to a safe operating value, the thermostat will reset automatically.

Fuse Shutdown. Internal component failure is prevented by fuses which protect the components from damage caused by excessive currents. Fuses will blow when the maximum rated current value for the fuse is exceeded. Fatigue failure of fuses can occur when mechanical vibrations from the installation combine with thermally induced stresses to weaken the fuse metal. Many fuse failures are caused by a temporary condition and replacing the blown fuse will make the fuse protected circuit operative.

MAINTENANCE

GENERAL

This section describes trouble analysis routine, calibration and test procedures that are useful for servicing the Lambda power supply. A trouble chart is provided as an aid for the troubleshooter. Refer to the section on specifications and features for the minimum performance standards.

TROUBLE ANALYSIS

Whenever trouble occurs, systematically check all fuses, primary power lines, external circuit elements, and external wiring for malfunction before trouble shooting the equipment. Failures and malfunctions often can be traced to simple causes such as improper jumpers and supply-load connections or fuse failure due to metal fatigue.

Use the electrical schematic diagram and block diagram, figure 7, as an aid to locating trouble causes. The schematic diagram contains various circuit voltages that are averages for normal no load operation. Measure these voltages using the conditions for measurement specified on the schematic diagram. Use measuring probes carefully to avoid causing short circuits and damaging circuit components.

CHECKING TRANSISTORS AND CAPACITORS

Check transistors with an in-circuit transistor checker. If no checker is available, transistors can be checked with an ohmmeter that has a highly limited current capability. Observe proper polarity for PNP or NPN to avoid error in measurement. The forward transistor resistance is low but never ZERO; backward resistance is always higher than the forward resistance.

Do not assume trouble is eliminated when only one part is replaced. This is especially true when one transistor fails, causing other transistors to fail. Replacing only one transistor and turning power on, before checking for additional faulty components could damage the replaced component.

When soldering semi-conductor devices, hold the lead being soldered with a pair of pliers or a commercial heat sink device placed between the component and the solder joint.

> NOTE: The leakage resistance obtained from a simple resistance check of a capacitor is not always an indication of a faulty capacitor. In all cases the capacitors are shunted with resistances, some of which have low values. Only a dead short is a true indication of a shorted capacitor.

PRINTED CIRCUIT BOARD MAINTENANCE TECHNIQUES

1. If foil is intact but not covered with solder it is a good contact. Do not attempt to cover with solder.

2. Voltage measurements can be made from either side of the board. Use a needle-point probe to penetrate to the wiring whenever a protective coating is used on the wiring. A brass probe can be soldered to an alligator clip adapted to measuring instrument.

3. Always use a heat sink when soldering transistors; a transistor pad with mounting feet is an effective heat sink.

4. Broken or damaged printed wiring is usually the result of an imperfection, strain or careless soldering. To repair small breaks, tin a short piece of hook-up wire to bridge the break, and holding the wire in place, flow solder along the length of wire so that it becomes part of the circuitry.

5. When unsoldering components from the board never pry or force loose the part; unsolder the component by using the wicking process described below:

   (a) Select a 3/16 inch tinned copper braid for use as a wick; if braid is not available, select AWG No. 14 or No. 16 stranded wire with 1/2 inch insulation removed.

   (b) Dip the wick in liquid rosin flux.

   (c) Place the wick onto the soldered connection and apply soldering iron onto the wick.

   (d) When sufficient amount of solder flows onto the wick, freeing the component, simultaneously remove iron and wick.

OUBLE CHART

The trouble chart is intended as a guide for locating trouble causes, and is used along with the schetic diagram.

The operating conditions assumed for the trouble chart are as follows:

(a) AC power of proper voltage and frequency is present at input terminals.

(b) Either positive or negative terminal is connected to chassis ground.

(c) The power supply is connected for constant voltage with local sensing. See schematic; dotted lines indicate jumpers connected for local sensing operation.

TROUBLE CHART

Symptom	Probable Cause	Remedy
No output voltage	No power input, thermostat S1 open	Check power source, S1, line cord and line cord plug; shut off unit, allow to cool and check ambient temperature
	Improper output terminal connection	Refer to appropriate connection diagram, and check for correct connections
	Faulty Q2, Q3, CR1, CR6	Check Q2, Q3, CR1, CR6 for short and replace as required
Unable to adjust tput voltage	Damaged VOLTAGE ADJUST control	Check R1 for shorts and/or open; replace as required
	Supply operating as constant current source at current limit value	Remove load, check load value and check for shorts and/or improper supply-load connections; refer to appropriate diagram for correct connections
Output voltage high	Improper output terminal connection	Refer to appropriate connection diagram, and check for correct connections
	Faulty Q1, R1, Q8-Q10 (or as applicable Q8, Q9 or Q9, Q10) Q5, Q6 (and as applicable Q8, Q12) or CR1	Check R1 for open; Q8-Q10 (Q8, Q9 or Q9 Q10) Q5 Q6 (Q8, Q12) Q1 for short; CR1 for open and replace as required.
Output voltage low	Load resistance improper for unit ratings	Check load resistance value
	Faulty Q2, Q3, R25A (or as applicable R25), R17	Check Q2, Q3 for short, R25A (R25) R17 for open, replace as required
High ripple and regulated DC output	Load resistance improper for unit ratings	Check load resistance value
High ripple	Improper ground	Connect terminal 6 or terminal 4 to ground terminal 5

RFORMANCE CHECK

Check the ripple and regulation of the power supply using the test connection diagram shown in figure Use suggested test equipment or equivalent to obtain accurate results. Refer to SPECIFICATIONS AND ATURES for minimum performance standards.

Set the differential meter, DC VTVM (John Fluke Model 825A or equivalent) to the selected power supply operating voltage. Check the power supply load regulation accuracy while switching from the full load to no-load condition. Long load leads should be a twisted pair to minimize AC pick-up.

Use a Variac to vary the line voltage from 105-132 or 132-105 volts AC and check the power supply line regulation accuracy on the VTVM differential meter.

Use a VTVM, Ballantine 320 or equivalent, to measure rms ripple voltage of the power supply DC output. Use oscilloscope to measure peak-to-peak ripple voltage of the power supply DC output.

ADJUSTMENT OF CALIBRATION CONTROL R17

The adjustment procedure requires that the power supply is removed from associated equipment, is at an ambient temperature of 25 - 30° C and has not been operated with load for at least one hour.

Whenever Q3, R25A (or R25) or R17 are replaced, and voltage and current indications do not reflect maximum ratings, adjust R17 as follows:

1. Remove AC power input to the supply.
2. Unsolder wiper of R17 from resistor housing and turn to full CW position.
3. Operate power supply for constant voltage with local sensing, connected as shown in figure 3, with no external load.
4. Turn voltage adjust control until minimum rated output voltage is obtained.
5. Apply load so that output current is 110% of 40° C rating for the unit.
6. Using an oscilloscope, Tektronix 503 or equivalent, observe output voltage while adjusting R17 in a CCW direction. Adjust R17 until output ripple increases sharply and oscilloscope pattern changes.
7. After adjustment is completed, remove AC power input to the supply and solder wiper of R17 to resistor housing.
8. After soldering, check setting and repeat adjustment procedure if required.

SERVICE

When additional instructions are required or repair service is desired, contact the nearest office of e Lambda Electronics Corp. where trained personnel and complete facilities are ready to assist you.

Please include the power supply model and serial number together with complete details of the roblem. On receipt of this information, Lambda will supply service data or advise shipping for factory re- ir service.

All repairs not covered by the warranty will be billed at cost and an estimate forwarded for approval efore work is started.

PARTS ORDERING

Standard Components and special components used in Lambda power supply can be obtained from the actory. In case of emergency, critical spare parts are available through any Lambda office.

The following information must be included when ordering parts:

1. Model number and serial number of power supply and purchase date.
2. Lambda part number.
3. Description of part together with circuit designation.
4. If part is not an electronic part, or is not listed, provide a description, function, and location of the part.

PARTS LIST

The electrical parts located on all LM-CC models are listed here. Parts common to a group of LM-CC models are listed first. Unique parts of individual models within the group are listed separately, by model, immediately following the group common-parts listing. In addition there are separate listings of parts for the metered panel (MP) option, the Y option, the T option, the R option, the V option and the overvoltage protection (OV) option, as applicable, for all LM-CC models.

MODELS LM-CC3 — LM-CC6

COMMON PARTS

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL-33-006	$ .27
C2	Cap., mylar, 0.22 mfd ±10%, 100 vdc	CGM-22-003	.33
C3	Cap., elect., 1,700 mfd -10 + 100%, 20 vdc	CBS-17-035	2.73
C4	Cap., elect., 3.0 mfd -10 + 75%, 100 vdc	CBN-30-015	1.58
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C6	Same as C5		
C7*	Cap., elect., 140 mfd -10 + 100%, 30 vdc	CBR-14-030	2.25
C8	Cap., elect., 25,000 mfd -10 + 100%, 20 vdc	CBT-25-011	12.28
C9	Cap., mylar, 0.1 mfd ±10%, 200 vdc	CAM-10-012	.65
C10	Same as C9		
C11 thru C29	Not assigned		
C30	Cap., mylar, 0.01 mfd ±20%, 80 vdc	CGL-10-008	.25
CR1*	Rectifier, zener diode	FBM-Z104	4.35
CR2	Rectifier	FBL-00-030	1.40
CR3	Same as CR2		
CR4, CR5	Not assigned		
CR6	Rectifier, zener diode	FBM-Z103	4.87
CR7	Same as CR1		
CR8	Rectifier	FBL-00-054 or FBL-00-045	1.35 1.23
CR9	Not assigned		
CR10	Same as CR8		
F1	Fuse, "slo-blo", 3 ag, 5 amperes	FFC-05-000	.18
F2	Fuse, 4 ag, 30 amperes	FFE-30-000	.20
Q1	Transistor, NPN	FBN-L110	3.25
Q2	Same as Q1		
Q3	Same as Q1		

MODELS LM-CC3 — LM-CC6 (Cont)

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
Q4	Not assigned		
Q5	Transistor, NPN	FBN-L109	$ 2.75
Q6	Transistor, NPN	FBN-36486	2.75
Q7	Not assigned		
Q8 thru Q10	Transistor, NPN	FBN-36485	4.13
R3	Res., ww, 1,200 ohms ±3%, 2 w	DFS-12-030	.90
R4*	Res., film, 15,000 ohms ±2%, 1/2 w	DCT-15-013	.30
R5	Res., film, 220 ohms ±2%, 1/2 w	DCR-22-005	.30
R6	Res., comp., 180,000 ohms ±10%, 1/2 w	DEB-1841	.12
R7	Res., film, 3,900 ohms ±5%, 1/2 w	DCS-39-014	.25
R8	Res., comp., 4,700 ohms ±10%, 1/2 w	DEB-4721	.12
R9	Res., comp., 150 ohms ±10%, 1/4 w	DCB-1511	.10
R10	Res., comp., 3,900 ohms ±10%, 1/2 w	DEB-3921	.12
R11	Res., comp., 22,000 ohms ±10%, 1/2 w	DEB-2231	.12
R12	Res., comp., 47 ohms ±10%, 1/2 w	DEB-4701	.12
R13*	Res., ww, 600 ohms ±3%, 3 w	DFR-60-005	.89
R14, R15	Not assigned		
R16	Res., comp., 470 ohms ±10%, 1/2 w	DEB-4711	.12
R17	Res., var., ww, 1,200 ohms ±10%, 1-1/2 w	DNS-12-026	1.25
R19 thru R21	Not assigned		
R22	Res., comp., 560 ohms ±10%, 1/2 w	DEB-5611	.12
R23	Res., comp., 56 ohms ±10%, 1/2 w	DEB-5601	.12

MODELS LM-CC3 — LM-CC6 (Cont)

COMMON PARTS (Cont)

DESCRIPTION	LAMBDA NO.	UNIT PRICE
Res., comp., 1,000 ohms ±10%, 1/2 w	DEB-1021	$ .12
Res., tapped, 3 sections, 30 ohms/ section, ±5%/ section, 11 w/section	DFM-90-055	2.60
Thermostat	FKA-142-015	5.00
Fuseholder	HRM-00-002	.20
Fuseholder, clip type	HRM-00-003	.40

*This part not used on units with "Y" option

UNIQUE PARTS

MODEL LM-CC3

Res. var., ww, 300 ohms ±5%, 5 w	DNR-30-016	1.95
Res., ww, 430 ohms ±3%, 3 w	DFR-43-058	.50
Not assigned		
Transformer	ABA-CC3P3	23.50

MODEL LM-CC3P3

Res., var., ww, 600 ohms ±5%, 5 w	DNR-60-017 or DNR-60-028	1.93 2.50
Res., ww, 430 ohms ±3%, 3 w	DFR-43-058	.50
Not assigned		
Transformer	ABA-CC3P3	23.50

MODEL LM-CC3P6

Res., var., ww, 600 ohms ±5%, 5 w	DNR-60-017 or DNR-60-028	1.93 2.50
Res., ww, 430 ohms ±3%, 3 w	DFR-43-058	.50
Not assigned		
Transformer	ABA-CC4	23.50

MODEL LM-CC4

Res., var., ww, 600 ohms ±5%, 5 w	DNR-60-017 or DNR-60-028	1.93 2.50
Res., ww, 600 ohms ±3%, 3 w	DFR-60-005	.89
Not assigned		
Transformer	ABA-CC4	23.50

MODEL LM-CC4P5

Res., var., ww, 600 ohms ±5%, 5 w	DNR-60-017 or DNR-60-028	1.93 2.50
Res., ww, 650 ohms ±3%, 3 w	DFR-65-062	1.00
Res., film, 390 ohms ±5%, 1/2 w	DCR-39-004	.20
Transformer	ABA-CC5	23.50

MODEL LM-CC5

Res., var., ww, 600 ohms ±5%, 5 w	DNR-60-017 or DNR-60-028	1.93 2.50
Res., ww, 650 ohms ±3%, 3 w	DFR-65-062	1.00
Res., film, 1,300 ohms ±5%, 1/2 w	DCS-13-010	.25
Transformer	ABA-CC5	23.50

UNIQUE PARTS (Cont)

MODEL LM-CC6

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R1	Res., var., ww, 600 ohms ±5%, 5 w	DNR-60-017 or DNR-60-028	$ 1.93 2.50
R2	Res., ww, 800 ohms ±3%, 2 w	DFR-80-037	.84
R18	Res., film, 1,300 ohms ±5%, 1/2 w	DCS-13-010	.25
T1	Transformer	ABA-CC6	23.50

MODELS LM-CC8 – LM-CC60

COMMON PARTS

C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL-33-006	.27
C2	Cap., mylar, 0.22 mfd ±10%, 100 vdc	CGM-22-003	.33
C4	Cap., elect., 3.0 mfd -10+75%, 100 vdc	CBN-30-015	1.58
C7	Cap., elect., 140 mfd -10%+100%, 30 vdc	CBR-14-030	1.58
C9	Cap., mylar, 0.1 mfd ±10%, 200 vdc	CAM-10-012	.65
C10 thru C12	Not assigned		
C30	Cap., mylar, 0.01 mfd ±20%, 80 vdc	CGL-10-008	.25
CR1*	Rectifier, zener diode	FBM-Z104	4.35
CR2	Rectifier	FBL-00-030	1.40
CR3	Same as CR2		
CR4, CR5	Not assigned		
CR6	Rectifier, zener diode	FBM-Z103	4.87
CR7	Same as CR2		
F1	Fuse, "Slo-Blo", 3 ag, 5 amperes	FFC-05-000	.18
Q1	Transistor, NPN	FBN-L110	3.25
Q2, Q3	Same as Q1		
Q4	Not assigned		
Q7	Not assigned		
R3	Res., WW, 1,200 ohms ±3%, 3w	DFS-12-030	.90
R4*	Res., film, 15,000 ohms ±2%, 1/2 w	DCT-15-013	.30
R5	Res., film, 220 ohms ±2% 1/2 w	DCR-22-005	.30
R6	Res., comp., 180,000 ohms ±10%, 1/2 w	DEB-1841	.12
R7	Res., film, 3,900 ohms ±5%, 1/2 w	DCS-39-014	.25
R8	Res., comp., 4,700 ohms ±10%, 1/2 w	DEB-4721	.12
R9	Res., comp., 150 ohms ±10%, 1/4w	DCB-1511	.10
R10	Res., comp., 3,900 ohms ±10%, 1/2w	DEB-3921	.12
R11	Res. comp., 22,000 ohms ±10%, 1/2w	DEB-2231	.12
R12	Res., comp., 47 ohms ±10%, 1/2w	DEB-4701	.12
R13*	Res., WW, 600 ohms, ±3% 3w	DFR-60-005	.89
R14, R15	Not assigned		
R17	Res., var., WW, 1,200 ohms ±10%, 1-1/2W	DNS-12-026	1.25

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R19 thru R21	Not assigned		
R22	Res., comp., 560 ohms ±10%, 1/2 w	DEB-5611	$ .12
S1	Thermostat	FKA-137-014	5.00
XF1	Fuseholder	HRM-00-002	.20
XF2	Fuseholder, clip type	HRM-00-003	.40
	*This part not used on units with "Y" option		

UNIQUE PARTS

MODEL LM-CC8

C3	Cap., elect., 1,700 mfd -10 + 100%, 20 vdc	CBS-17-035	2.73
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C6	Same as C5		
C8	Cap., elect., 25,000 mfd -10 + 100%, 20 vdc	CBT-25-011	12.28
CR8 thru CR11	Rectifier	FBL-00-054 or FBL-00-045	1.35 1.23
F2	Fuse, 4 ag, 30 amperes	FFE-30-000	.20
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36486	2.75
Q8 thru Q10	Transistor, NPN	FBN-36485	4.13
R1	Res., ww, 1,000 ohms ±5%, 5 w	DNS-10-027	1.50
R2	Res., ww, 1,200 ohms ±3%, 3 w	DFS-12-030	.90
R16	Res., comp., 470 ohms ±10%, 1/2 w	DEB-4711	.12
R18	Res., film, 2,400 ohms ±5%, 1/2 w	DCS-24-001	.25
R23	Res., comp., 56 ohms ±10%, 1/2 w	DEB-5601	.12
R24	Res., comp., 1,500 ohms ±10%, 1/2 w	DEB-1521	.12
R25A, B, C	Res., tapped, 3 sections, .30 ohms/section ±5%/ section, 11 w/section	DFM-90-055	2.60
T1	Transformer	ABA-CC8	23.50

MODEL LM-CC10

C3	Cap., elect., 1,700 mfd -10 + 100%, 20 vdc	CBS-17-035	2.73
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C6	Same as C5		
C8	Cap., elect., 14,000 mfd -10 + 100%, 35 vdc	CBT-14-012	12.28
CR8 thru CR11	Rectifier	FBL-00-054 or FBL-00-045	1.35 1.23
F2	Fuse, 4 ag, 20 amperes	FFE-20-000	.18
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36486	2.75
Q8 thru Q10	Transistor, NPN	FBN-36485	4.13
R1	Res., var., ww, 2,200 ohms ±5%, 5 w	DNS-22-029 or DNS-22-056	1.75 2.50
R2	Res., ww, 1,200 ohms ±3%, 3 w	DFS-12-030	.90
R16	Res., comp., 470 ohms ±10%, 1/2 w	DEB-4711	.12
R18	Res., film, 2,400 ohms ±5%, 1/2 w	DCS-24-001	.25

MODEL LM-CC10 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R23	Res., comp., 56 ohms ±10%, 1/2 w	DEB-5601	$ .12
R24	Res., comp., 1,500 ohms ±10%, 1/2 w	DEB-1521	.12
R25A, B, C	Res., tapped, 3 sections, .30 ohms/section ±5%/ section, 11 w/section	DFM-90-055	2.60
T1	Transformer	ABA-CC10	23.50

MODEL LM-CC12

C3	Cap., elect., 900 mfd -10 + 100%, 35 vdc	CBR-90-040	2.27
C5	Cap., mylar, .018 mfd, ±10%, 200 vdc	CGL-18-005	.24
C6	Same as C5		
C8	Cap., elect., 14,000 mfd -10 + 100%, 35 vdc	CBT-14-012	12.28
CR8 thru CR11	Rectifier	FBL-00-054 FBL-00-046	1.35 1.25
F2	Fuse, 4 ag, 20 amperes	FFE-20-000	.18
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36486	2.75
Q8 thru Q10	Transistor, NPN	FBN-36485	4.13
R1	Res., var., ww, 2,200 ohms ±5%, 5 w	DNS-22-029 or DNS-22-056	1.75 2.50
R2	Res., ww, 1,800 ohms ±3%, 3 w	DFS-18-048	.60
R16	Res., comp., 470 ohms ±10%, 1/2 w	DEB-4711	.12
R18	Res., film, 2,400 ohms ±5%, 1/2 w	DCS-24-001	.25
R23	Res., comp., 56 ohms ±10%, 1/2 w	DEB-5601	.12
R24	Res., comp., 3,300 ohms ±10%, 1/2 w	DEB-3321	.12
R25A, B, C	Res., tapped, 3 sections, .30 ohms/section, ± 5%/ section, 11 w/section	DFM-90-055	2.60
T1	Transformer	ABA-CC12	23.50

MODEL LM-CC15

C3	Cap., elect., 900 mfd -10 + 100%, 35 vdc	CBR-90-040	2.27
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C6	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
C8	Cap., elect., 14,000 mfd -10 +100%, 35 vdc	CBT-14-012	12.28
CR8 thru CR11	Rectifier	FBL-00-054 or FBL-00-056	1.35 1.25
F2	Fuse, 4 ag, 20 amperes	FFE-20-000	.18
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36486	2.75
Q8, Q9	Transistor, NPN	FBN-36485	4.13
Q10	Not assigned		
R1	Res., var., ww, 2,200 ohms ±5%, 5 w	DNS-22-029 or DNS-22-056	1.75 2.50
R2	Res., ww, 1,800 ohms ±3%, 3 w	DFS-18-048	.60
R16	Res., comp., 1,000 ohms ±10%, 1/2 w	DEB-1021	.12
R18	Res., film, 2,400 ohms ±5%, 1/2 w	DCS-24-001	.25
R23	Res., comp., 68 ohms ±10%, 1/2 w	DEB-6801	.12

MODEL LM-CC15 (Cont)

DESCRIPTION	LAMBDA NO.	UNIT PRICE
Res., comp., 3,300 ohms ±10%, 1/2 w	DEB-3321	$ .12
Res., tapped, 2 sections, .47 ohms/section ±5%/ section, 8 w/section	DFM-94-051	3.30
Transformer	ABA-CC15	23.50

MODEL LM-CC18

Cap., elect., 900 mfd -10 + 100%, 35 vdc	CBR-90-040	2.20
Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
Cap., elect., 14,000 mfd -10 + 100%, 35 vdc	CBT-14-012	12.28
Rectifier	FBL-00-054 or FBL-00-046	1.35 1.25
Fuse, 4 ag, 20 amperes	FFE-20-000	.18
Transistor, NPN	FBN-L109	2.75
Transistor, NPN	FBN-35469	4.29
Transistor, NPN	FBN-36220	6.60
Not assigned		
Res., var., ww, 2,200 ohms ±5%, 5 w	DNS-22-029 or NDS-22-056	1.75 2.50
Res., ww, 2,500 ohms ±3%, 3 w	DFS-25-036	.53
Res., comp., 1,000 ohms ±10%, 1/2 w	DEB-1021	.12
Res., film, 6,800 ohms ±5%, 1/2 w	DCS-68-021	.25
Res., comp., 68 ohms ±10%, 1/2 w	DEB-6801	.12
Res., comp., 3,300 ohms ±10%, 1/2 w	DEB-3321	.12
Res., tapped, 2 sections, .47 ohms/section ±5%/ section, 8 w/section	DFM-94-051	3.30
Transformer	ABA-CC18	23.50

MODEL LM-CC20

Cap., elect., 900 mfd -10 + 100%, 35 vdc	CBR-90-040	2.20
Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
Same as C5		
Cap., elect., 7,800 mfd -10 + 100%, 60 vdc	CBS-78-045	8.18
Rectifier	FBL-00-054 or FBL-00-041	1.35 1.23
Fuse, 4 ag, 20 amperes	FFE-20-000	.18
Transistor, NPN	FBN-L109	2.75
Transistor, NPN	FBN-35469	4.29
Transistor, NPN	FBN-36220	6.60
Not assigned		
Res., var., ww, 2,200 ohms ±5%, 5 w	DNS-22-029 or DNS-22-056	1.75 2.50
Res., ww, 2,500 ohms ±3%, 3 w	DFS-25-036	.53
Res., comp. 1,800 ohms ±10%, 1/2 w	DEB-1821	.12
Res., film, 6,800 ohms ±5%, 1/2 w	DCS-68-021	.25
Res., comp., 68 ohms ±10%, 1/2 w	DEB-6801	.12
Res., comp., 8,200 ohms ±10%, 1/2 w	DEB-8221	.12

MODEL LM-CC20 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R25A, B	Res., tapped, 2 sections, .47 ohms/section ±5%/ section, 8 w/section	DFM-94-051	$ 3.30
T1	Transformer	ABA-CC20	23.50

MODEL LM-CC24

C3	Cap., elect., 500 mfd -10 +100%, 60 vdc	CBR-50-041	2.27
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C6	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
C8	Cap., elect., 7,800 mfd -10 + 100%, 60 vdc	CBS-78-045	8.18
CR8 thru CR11	Rectifier	FBL-00-054 or FBL-00-041	1.35 1.23
F2	Fuse, 4 ag, 20 amperes	FFE-20-000	.18
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36488	3.75
Q8, Q9	Transistor, NPN	FBN-36220	6.60
Q10	Not assigned		
R1	Res., var., ww, 2,200 ohms ±5%, 5 w	DNS-22-029 or DNS-22-056	1.75 2.50
R2	Res., ww, 3,600 ohms ±3%, 3 w	DFS-36-050	.60
R16	Res., comp., 1,000 ohms ±10%, 1/2 w	DEB-1021	.12
R18	Res., film, 6,800 ohms ±5%, 1/2 w	DCS-68-021	.25
R23	Res., comp., 68 ohms ±10%, 1/2 w	DEB-6801	.12
R24	Res., comp., 8,200 ohms ±10%, 1/2 w	DEB-8221	.12
R25A, B	Res., tapped, 2 sections, .75 ohms/section ±5%/ section, 8 w/section	DFN-15-056	1.50
T1	Transformer	ABA-CC24	23.50

MODEL LM-CC28

C3	Cap., elect., 500 mfd -10 + 100%, 60 vdc	CBR-50-041	2.27
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C6	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
C8	Cap., elect., 7,800 mfd -10 + 100%, 60 vdc	CBS-78-045	8.18
CR8 thru CR11	Rectifier	FBL-00-054 or FBL-00-041	1.35 1.23
F2	Fuse, 4 ag, 10 amperes	FFE-10-000	.25
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36488	3.75
Q8, Q9	Transistor, NPN	FBN-36487	5.63
Q10	Not assigned		
R1	Res., var., ww, 2,200 ohms ±5%, 5 w	DNS-22-029 or DNS-22-056	1.75 2.50
R2	Res., ww, 4,500 ohms ±3%, 3w	DFS-45-044	.87
R16	Res., comp., 1,800 ohms ±10%, 1/2 w	DEB-1821	.12
R18	Res., film, 6,800 ohms ±10%, 1/2 w	DCS-68-021	.25
R23	Res., comp., 68 ohms ±10%, 1/2 w	DEB-6801	.12
R24	Res., comp., 8,200 ohms ±10%, 1/2 w	DEB-8221	.12

UNIQUE PARTS (Cont)

MODEL LM-CC28 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R25A, B	Res., tapped, 2 sections, .75 ohms/section ±5%/ section, 8 w/section	DFN-15-056	$ 1.50
T1	Transformer	ABA-CC28	23.50

MODEL LM-CC36

C3	Cap., elect., 500 mfd -10 + 100%, 60 vdc	CBR-50-041	2.27
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C6	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
C8	Cap., elect., 7,800 mfd -10 +100%, 60 vdc	CBS-78-045	8.18
CR8 thru CR11	Rectifier	FBL-00-054 or FBL-00-038	1.35 1.10
F2	Fuse, 4 ag, 10 amperes	FFE-10-000	.25
Q5	Transistor, NPN	FBN-L109	2.75
Q6	Transistor, NPN	FBN-36488	3.75
Q8, Q9	Transistor, NPN	FBN-36487	5.63
Q10	Not assigned		
R1	Res., var., ww, 3,300 ohms ±5%, 5 w	DNS-33-033 or DNS-33-057	1.50 2.50
R2	Res., ww, 5,600 ohms ±3%, 3 w	DFS-56-053	.60
R16	Res., comp., 1,800 ohms ±10%, 1/2 w	DEB-1821	.12
R18	Res., film, 10,000 ohms ±5%, 1/2 w	DCT-10-008	.25
R23	Res., comp., 68 ohms ±10%, 1/2 w	DEB-6801	.12
R24	Res., comp., 15,000 ohms ±10%, 1/2 w	DEB-1531	.12
R25A, B	Res., tapped, 2 sections, .75 ohms/section ±5%/ section, 8 w/section	DFN-15-056	1.50
T1	Transformer	ABA-CC36	23.50

MODEL LM-CC48

C3	Cap., elect., 200 mfd -10 +100%, 100 vdc	CBR-20-043	2.38
C5	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
C6	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C8	Cap., elect., 3,000 mfd -10 + 100%, 100 vdc	CBS-30-047	11.16
CR8 thru CR11	Rectifier	FBL-00-054 or FBL-00-038	1.35 1.10
F2	Fuse, 4 ag, 10 amperes	FFE-10-000	.25
Q5	Transistor, NPN	FBN-L108	2.52
Q6	Transistor, NPN	FBN-35903	5.17
Q8, Q9	Transistor, NPN	FBN-35902	9.90
Q10	Not assigned		
R1	Res., var., ww, 3,300 ohms ±5%, 5 w	DNS-33-033 or DNS-33-057	1.50 2.50
R2	Res., ww, 8,000 ohms ±3%, 3 w	DFS-80-054	1.03
R16	Res., comp., 1,800 ohms ±10%, 1/2 w	DEB-1821	.12
R18	Res., film, 10,000 ohms ±5%, 1/2 w	DCT-10-008	.25
R23	Res., comp., 68 ohms ±10%, 1/2 w	DEB-6801	.12
R24	Res., comp., 15,000 ohms ±10%, 1/2 w	DEB-1531	.12

*This component not used on units with "Y" option

UNIQUE PARTS (Cont)

MODEL LM-CC48 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R25	Res., ww, 1.0 ohms ±3%, 3 w	DFN-10-041	$ .66
R26	Same as R25		
T1	Transformer	ABA-CC48	23.50

MODEL LM-CC60

C3	Cap., elect., 200 mfd -10 + 100%, 100 vdc	CBR-20-043	2.38
C5	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
C6	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.24
C8	Cap., elect., 3,000 mfd -10 + 100%, 100 vdc	CBS-30-047	11.16
CR8 thru CR11	Rectifier	FBL-00-054 or FBL-00-038	1.35 1.10
F2	Fuse, 4 ag, 5 amperes	FFE-05-000	.25
Q5	Transistor, NPN	FBN-L108	2.52
Q6	Transistor, NPN	FBN-35903	5.17
Q8, Q9	Transistor, NPN	FBN-35902	9.90
Q10	Not assigned		
R1	Res., var., ww, 4,500 ohms ±5%, 5 w	DNS-45-030 or DNS-45-050	2.38 2.50
R2	Res., ww, 10,000 ohms ±3%, 5 w	DFT-10-042	.65
R16	Res., comp., 1,800 ohms ±10%, 1/2 w	DEB-1821	.12
R18	Res., film, 15,000 ohms ±2%, 1/2 w	DCT-15-013	.30
R23	Res., comp., 68 ohms ±10%, 1/2 w	DEB-6801	.12
R24	Res., comp., 22,000 ohms ±10%, 1/2 w	DEB-2231	.12
R25	Res., ww, 1.0 ohms ±3%, 3 w	DFN-10-041	.66
R26	Same as R25		
T1	Transformer	ABA-CC60	23.50

MODELS LM-CC100 — LM-CC150

COMMON PARTS

C1	Cap., mylar, 0.033 mfd ±10%, 400 vdc	CGL-33-006	.27
C2	Cap., mylar, 0.15 mfd ±10%, 200 vdc	CGM-15-005	.40
C3	Cap., elect., 90 mfd -10 + 100%, 250 vdc	CBP-90-015	1.70
C4	Cap., elect., 3.5 mfd -10 + 100%, 300 vdc	CBN-35-018	1.12
C5	Cap., mylar, .018 mfd ±10%, 200 vdc	CGL-18-005	.25
C6	Cap., mylar, 0.01 mfd ±10%, 200 vdc	CGL-10-002	.36
C7*	Cap., elect., 140 mfd -10 +100%, 30 vdc	CBR-14-030	1.58
C9, C10	Not assigned		
C11	Same as C1		
C12	Not assigned		
C13	Same as C5		
C14	Same as C5		
C15 thru C29	Not assigned		
C30	Cap., mylar, 0.01 mfd ±20%, 80 vdc	CGL-10-008	.25
CR1*	Rectifier, zener diode	FBM-Z104	4.35
CR2	Rectifier	FBL-00-030	1.40

COMMON PARTS (Cont)

DESCRIPTION	LAMBDA NO.	UNIT PRICE
Same as CR2		$
Not assigned		
Rectifier, zener diode	FBM-Z103	4.87
Same as CR2		
Fuse, "Slo-Blo", 2 AG, 5 amperes	FFC-05-000	.18
Fuse, 4 AG, 5 amperes	FFE-05-000	.25
Transistor, NPN	FBN-L110	3.25
Same as Q1		
Same as Q1		
Not assigned		
Transistor, NPN	FBN-L108	2.25
Transistor, NPN	FBN-35903	5.17
Not assigned		
Same as Q5		
Transistor, NPN	FBN-35902	9.90
Same as Q9		
Not assigned		
Same as Q6		
Res., var., ww, 9,000 ohms ±5%, 5w	DNS-90-031 or DNS-90-058	2.38 2.50
Res., ww, 1,200 ohms ±3%, 2w	DFS-12-030	.90
Res., film, 15,000 ohms ±2%, 1/2w	DCT-15-013	.30
Res., film, 220 ohms ±2%, 1/2w	DCR-22-005	.30
Res., comp., 180,000 ohms ±10%, 1/2w	DEB-1841	.12
Res., film, 3,900 ohms ±5%, 1/2w	DCS-39-014	.25
Res., comp., 4,700 ohms ±10%, 1/4w	DEB-4721	.12
Res., comp., 150 ohms 10%, 1/4w	DCB-1511	.10
Res., comp., 3,900 ohms ±10%, 1/2w	DEB-3921	.12
Res., comp., 22,000 ohms ±10%, 1/2w	DEB-2231	.12
Res., comp., 47 ohms ±10%, 1/2w	DEB-4701	.12
Res., ww, 600 ohms ±3%, 3w	DFR-60-005	.89
Not assigned		
Res., comp., 1800 ohms ±10%, 1/2w	DEB-1821	.12
Res., var., ww, 1,200 ohms 10%, 1-1/2w	DNS-12-026	1.25
Not assigned		
Res., comp., 560 ohms ±10%, 1/2w	DEB-5611	.12
Res., comp., 150 ohms ±10%, 1/2w	DEB-1511	.12
Res., film, 56,000 ohms ±5%, 1w	DCT-56-017	.25
Res., ww, 1.0 ohms ±3%, 3w	DFN-10-041	.66
Not assigned		
Same as R23		
Not assigned		
Not assigned		
Res., film, 33,000 ohms ±10%, 2w	DCT-33-023	.20
Not assigned		
Same as R22		
Thermostat	FKA-137-014	5.00

MODELS LM-CC100 — LM-CC150 (Cont)

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
XF1	Fuseholder	HRM-00-002	$ .20
XF2	Fuseholder, clip type	HRM-00-003	.40

*This component not used on units with "Y" option

UNIQUE PARTS

MODEL LM-CC100

C8	Cap., elect., 1,500 mfd -10 +100%, 200 vdc	CBS-15-031	11.16
CR8 thru CR11	Rectifier	FBL-00-065	1.15
R2	Res., ww, 16,000 ohms 3%, 5w	DFT-16-039	.85
R18	Res., film, 39,000 ohms ±5%, 1/2w	DCT-39-015	.30
R36	Res., film, 24,000 ohms ±2%, 2w	DCT-24-018	.50
R37	Same as R36		
T1	Transformer	ABA-CC100	23.50

MODEL LM-CC120

C8	Cap., elect., 1,200 mfd -10 +100%, 250 vdc	CBS-12-048	11.16
CR8 thru CR11	Rectifier	FBL-00-065	1.15
R2	Res., ww, 20,000 ohms ±3%, 5w	DFT-20-040	.85
R18	Res., film, 43,000 ohms ±5%, 1/2w	DCT-43-016	.30
R36	Res., film, 24,000 ohms ±2%, 2w	DCT-24-018	.50
R37	Same as R36		
T1	Transformer	ABA-CC120	23.50

MODEL LM-CC150

C8	Cap., elect., 1,200 mfd -10% +100%, 250 vdc	CBS-12-048	11.16
CR8 thru CR11	Rectifier	FBL-00-066	1.45
R2	Res., ww, 26,000 ohms ±3%, 5w	DFT-26-041	1.20
R18	Res., film, 56,000 ohms ±5%, 1w	DCT-56-017	.25
R36	Res., film, 33,000 ohms ±2%, 2w	DCT-33-019	1.00
R37	Same as R36		
T1	Transformer	ABA-CC150	23.50

PARTS FOR "MP" OPTION

MODELS MP-5, P-5

C1	Cap., tant., 2.5 mfd -15 +75%, 100 vdc (All)	CBN-25-010	1.80
C2	Same as C1		
DS1	Pilot light assembly (All)	HRD-00-007	.83
F1	Fuse, 3 AG, "Slo-Blo", 5 amperes (All)	FFC-05-000	.18
XF1	Fuseholder (All)	HRK-00-005	.50
M1*	Meter, volts, d.c., 0-5 vdc (LM-CC3 thru LM-CC4P5)	EBN-50-003	14.40
M1*	Meter, volts, d.c., 0-8 vdc (LM-CC5, LM-CC6)	EBN-80-005	12.00
M1*	Meter, volts, d.c., 0-10 vdc (LM-CC8)	EBP-10-016	18.00
M1*	Meter, volts, d.c., 0-15 vdc (LM-CC10, LM-CC12)	EBP-15-017	18.00
M1*	Meter, volts, d.c., 0-20 vdc (LM-CC15, LM-CC18)	EBP-20-014	18.00

PARTS FOR "MP" OPTION (Cont)

MODELS MP-5, P-5 (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
M1*	Meter, volts, d.c., 0-25 vdc (LM-CC20)	EBP-25-018	18.00
M1*	Meter, volts, d.c., 0-40 vdc (LM-CC24, LM-CC28, (LM-CC36)	EBP-40-013	18.00
M1*	Meter, volts, d.c., 0-60 vdc (LM-CC48)	EBP-60-015	18.00
M1*	Meter, volts, d.c., 0-80 vdc (LM-CC60)	EBP-80-019	18.00
M1*	Meter, volts, d.c., 0-120 vdc (LM-CC100)	EBR-12-075	18.00
M1*	Meter, volts, d.c., 0-150 vdc (LM-CC120)	EBR-15-076	18.00
M1*	Meter, volts, d.c., 0-200 vdc (LM-CC150)	EBR-20-077	18.00
M2*	Meter, amperes, d.c., 0-1.0 ampere (LM-CC100 thru LM-CC150)	EDN-10-014	18.00
M2*	Meter, amperes, d.c., 0-3 amperes (LM-CC36, LM-CC48)	EDN-30-019	18.00
M2*	Meter, amperes, d.c., 0-5 amperes (LM-CC20 thru LM-CC28	EDN-50-021	18.00
M2*	Meter, amperes, d.c., 0-6 amperes (LM-CC15, LM-CC18)	EDN-60-018	18.00
M2*	Meter, amperes, d.c., 0-10 amperes (LM-CC6 thru LM-CC12)	EDP-10-013	18.00
M2*	Meter, amperes, d.c., 0-15 amperes (LM-CC3 thru LM-CC5)	EDP-15-014	18.00
M2*	Meter, amperes, d.c., 0-2 amperes (LM-CC60)	EDN-20-022	18.00
R1	Res., var., ww, 2,200 ohms ±5%, 5 w (LM-CC10 thru LM-CC28)	DNS-22-023 or DNS-22-053	1.75 2.50
R1	Res., var., ww, 4,500 ohms ±5%, 5 w (LM-CC60)	DNS-45-024 or DNS-45-059	1.75 2.50
R1	Res., var., ww, 9,000 ohms ±5%, 5 w (LM-CC100 thru LM-CC150)	DNS-90-025 or DNS-90-051	2.00 2.50
R1	Res., var., ww, 300 ohms ±5%, 5 w (LM-CC3)	DNR-30-018	1.95
R1	Res., var., ww, 600 ohms ±5%, 5 w (LM-CC3P3 thru LM-CC6)	DNR-60-019 or DUR-60-026	2.25 2.50
R1	Res., var., ww, 1,000 ohms ±5%, 5 w (LM-CC8)	DNS-10-032	1.95
R1	Res., var., ww, 3,300 ohms ±5%, 5 w (LM-CC36, LM-CC48)	DNS-33-035 or DNS-33-054	2.00 2.50
S1	Switch, SPST. (All)	FDA-11-022	2.50

*This part only used on MP-5

PARTS FOR "OV" OPTION

MODELS LMOV-1, -2, -3

COMMON PARTS

C1	Cap., mylar, 0.01 mfd ±20%, 80 vdc	CGL-10-008	.25
Q1	Transistor, NPN	FBN-L102	2.40
R3	Res., film, 200 ohms ±5%, 1/2 w	DCR-20-010	.20
R4	Res., thermistor, 425 ohms ±5%, 1-1/4 w	DKR-43-001	1.52
R5	Res., comp., 1,200 ohms ±10%, 1/2 w	DEB-1221	.12
R6	Same as R5		

PARTS FOR "OV" OPTION (Cont)

MODELS LMOV-1, -2, -3 (Cont)

COMMON PARTS (Cont)

CIRC. DESIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
R8	Res., comp., 15,000 ohms ±10%, 1/2 w	DEB-1531	.12
R10	Same as R5		
SCR1	Rectifier, silicon, controlled	FBP-00-009	5.50

UNIQUE PARTS

MODEL LMOV-1

Q2	Transistor, PNP	FBN-L103	1.76
R1	Res., var., ww, 2,000 ohms ±10%, 1 w	DNS-20-034	3.00
R2	Res., film, 560 ohms ±2%, 1/2 w	DCR-56-002	.65
R7	Res., comp., 33 ohms ±5%, 1/4 w	DCB-3305	.15
R9	Not used		

MODEL LMOV-2

Q2	Transistor, PNP	FBN-L103	1.76
R1	Res., var., ww, 5,000 ohms ±10%, 1 w	DNS-50-036	3.15
R2	Res., film, 1,470 ohms ±1%, 1/2 w	DCS-15-031	.30
R7	Res., comp., 33 ohms ±5%, 1/4 w	DCB-3305	.15
R9	Not used		

MODEL LMOV-3

Q2	Transistor, PNP	FBN-L114	3.50
R1	Res., var., ww, 20,000 ohms ±10%, 1 w	DNT-20-010	3.25
R2	Res., film, 4,700 ohms ±2%, 1/2 w	DCS-47-028	.30
R7	Res., comp., 39 ohms ±5%, 1/4 w	DCB-3905	.15
R9	Res., comp., 22 ohms ±10%, 1/2 w	DEB-2201	.12

PARTS FOR "Y" OPTION

C107	Cap., elect., 40 mfd, 35 vdc	CBP-40-014	1.68
CR1	Rectifier, zener diode	FBM-Z107	3.75
CR101	Rectifier, zener diode	FBM-Z104	4.35
Q101	Transistor NPN	FBN-L109	2.75
R4	Res., comp., 220,000 ±10%, 1/2 w	DEB-2241	.12
R101	Res., film, 6,800 ohms ±2%, 1/4 w	DCS-68-032	.30
R102	Res., film, 220 ohms ±2%, 1/4 w	DCR-22-014	.30

PARTS FOR "T" OPTION

All "CC" package models EXCEPT F1 changes on LM-CC3 thru LM-CC8. The following parts change and a resistor is added in series to DS-1 of "MP" option:

C1	Cap., mylar, 0.033 mfd ±10% 600 vdc.	CGL-33-014	.35
F1	Fuse, "SLO-BLO", 2.5 amps. 250V	FFG-02-500	.25
T1	Transformer	Add Suffix "T" to Reg. T1 No.	Same as Reg. T1
DS1-Res	Res., comp., 120K ±10%	DEB-1241	.12

MODELS LM-CC3 THRU LM-CC8

All changes and additions apply except F1 is:

F1	Fuse, "SLO-BLO", 2.0 amps. 250V	FFG-02-000	.25

PARTS FOR "R" OPTION

riable resistor R1 and transformer T1 change on all "CC" kage models with suffix "R". Part no. changes for R1 are ed here. For transformer T1 used on these models see stan- d "CC" model parts lists for the standard transformer part no. add suffix "R" to the part no. Price for T1 does not change.

RC. SIG.	DESCRIPTION	LAMBDA NO.	UNIT PRICE
	MODEL LM-CC3		
	Res., var., ww, 300 ohms ±5%, 5 w	DNR-30-029	6.25
	MODELS LM-CC3P3-LM-CC6		
	Res., var., ww, 600 ohms ±5%, 5 w	DNR-60-030	6.25
	MODEL LM-CC8		
	Res., var., ww, 1000 ohms ±5%, 5 w	DNS-10-064	6.25
	MODELS LM-CC10-LM-CC28		
	Res., var., ww, 2200 ohms ±5%, 5 w	DNS-22-065	6.25
	MODELS LM-CC36-LM-CC48		
	Res., var., ww, 3300 ohms ±5%, 5 w	DNS-33-066	6.25
	MODEL LM-CC60		
	Res., var., ww, 4500 ohms ±5%, 5 w	DNS-45-067	6.25
	MODELS LM-CC100-LM-CC150		
	Res., var., ww, 9000 ohms ±5%, 5 w	DNS-90-068	6.25

PARTS FOR V OPTION

"CC" Package Models with the "V" Option have the same rt changes as listed for the "T" Option except for transformer listed below.

Transformer	Add suffix "V" to reg. T1 No.	Same as reg. T1

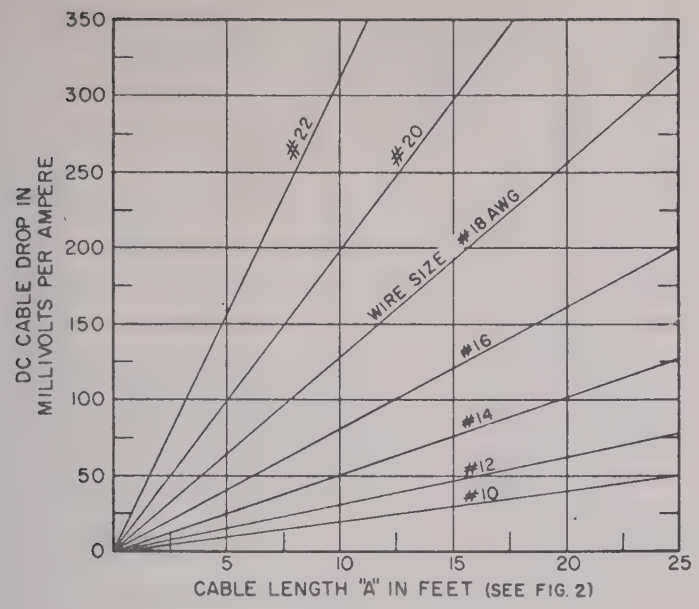


Figure 1. Cable Connection Chart

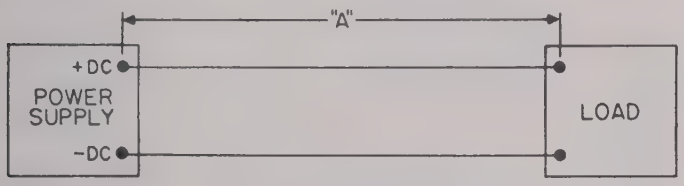
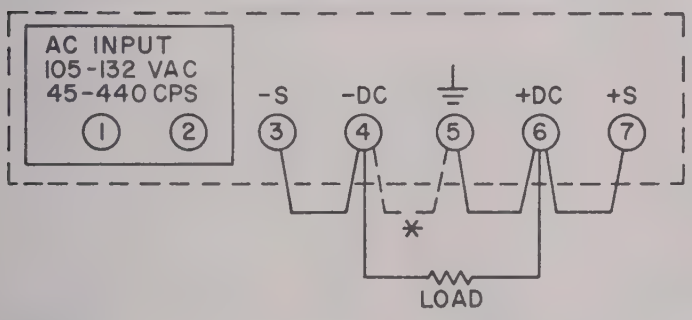
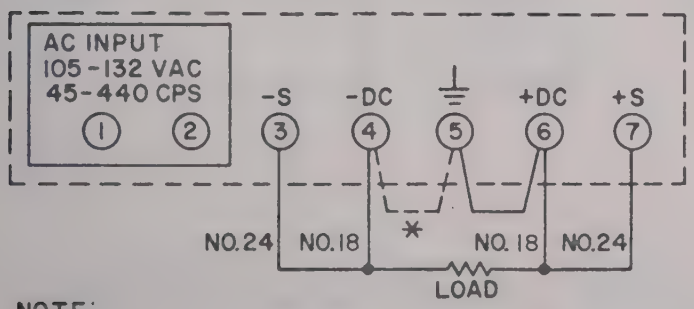


Figure 2. Cable Length "A" in Feet



NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.

Figure 3. Local Sensing Connections



NOTE:
* FOR NEGATIVE GROUND, DISCONNECT JUMPER FROM TERMINALS 5 AND 6 AND RECONNECT TO TERMINALS 4 AND 5.

Figure 4. Remote Sensing Connections

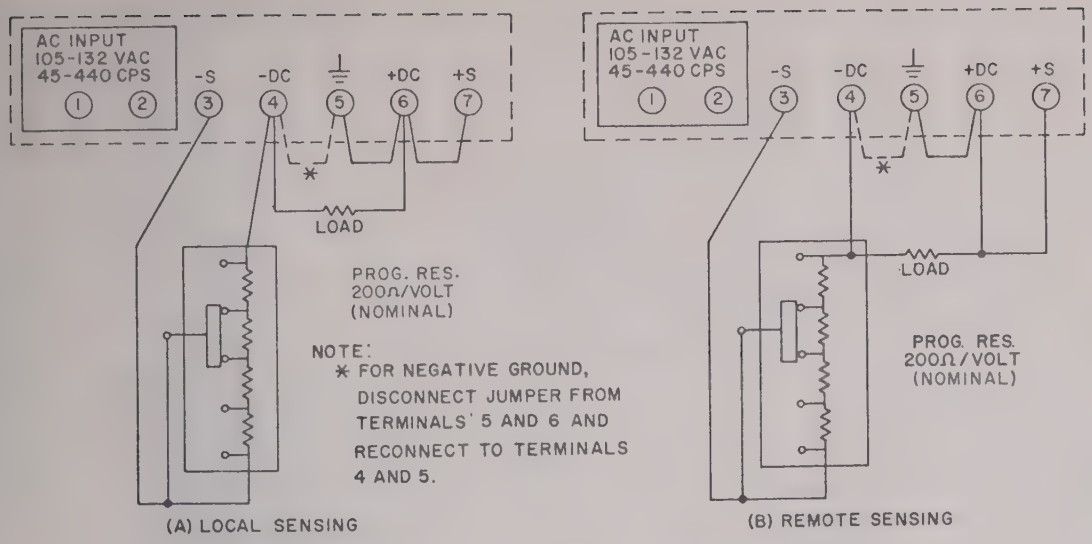


Figure 5. Programmed Voltage, with External Resistor

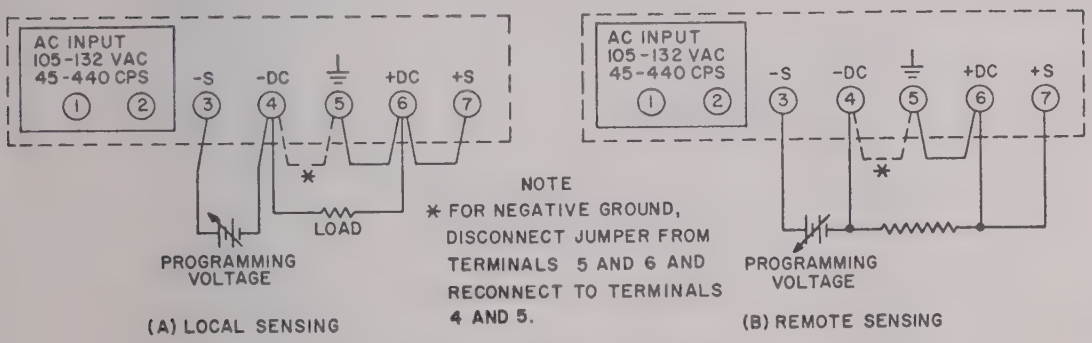


Figure 6. Programmed Voltage, with External Programming Voltage Source

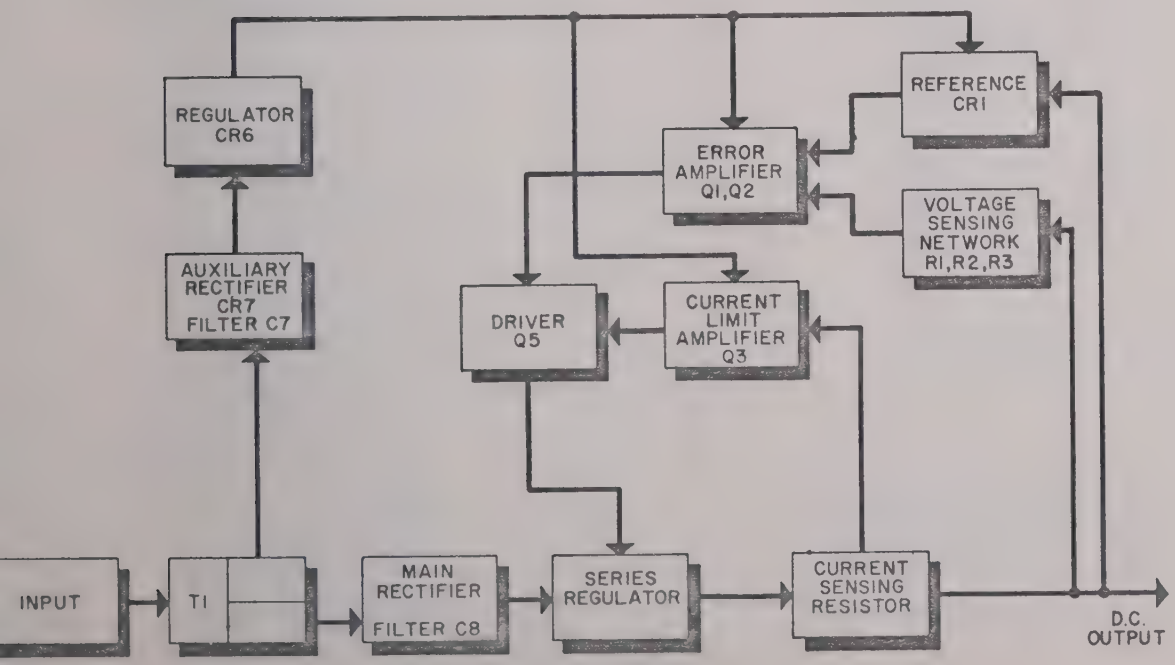


Figure 7. Typical Block Diagram

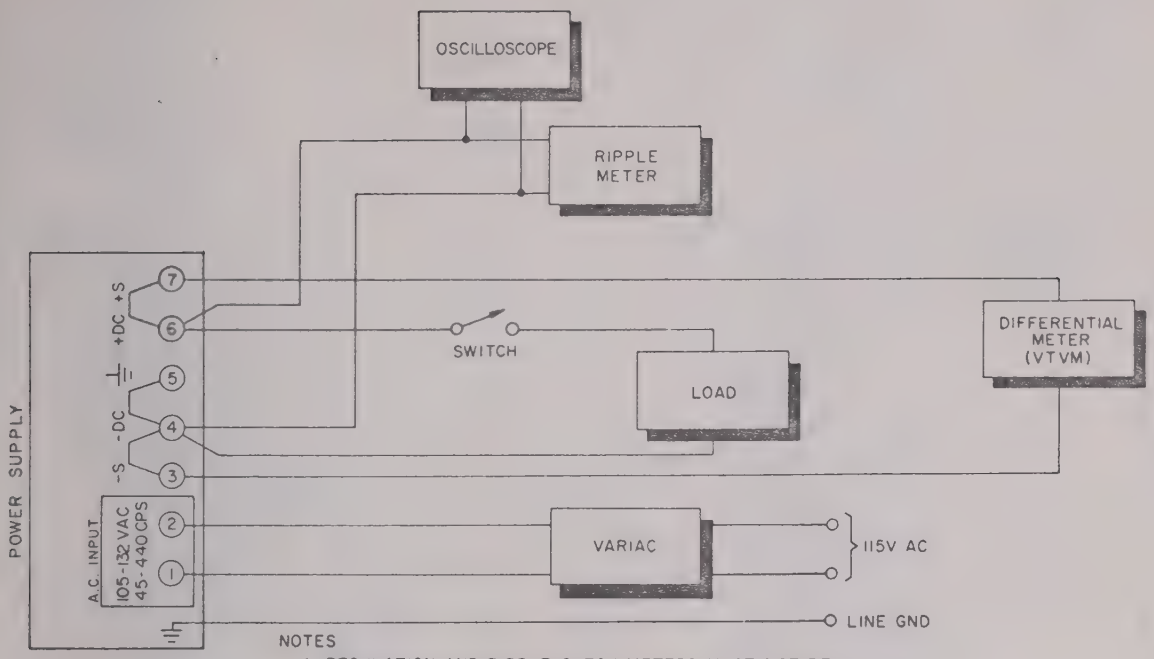


Figure 8. Test Connections for Performance Checks

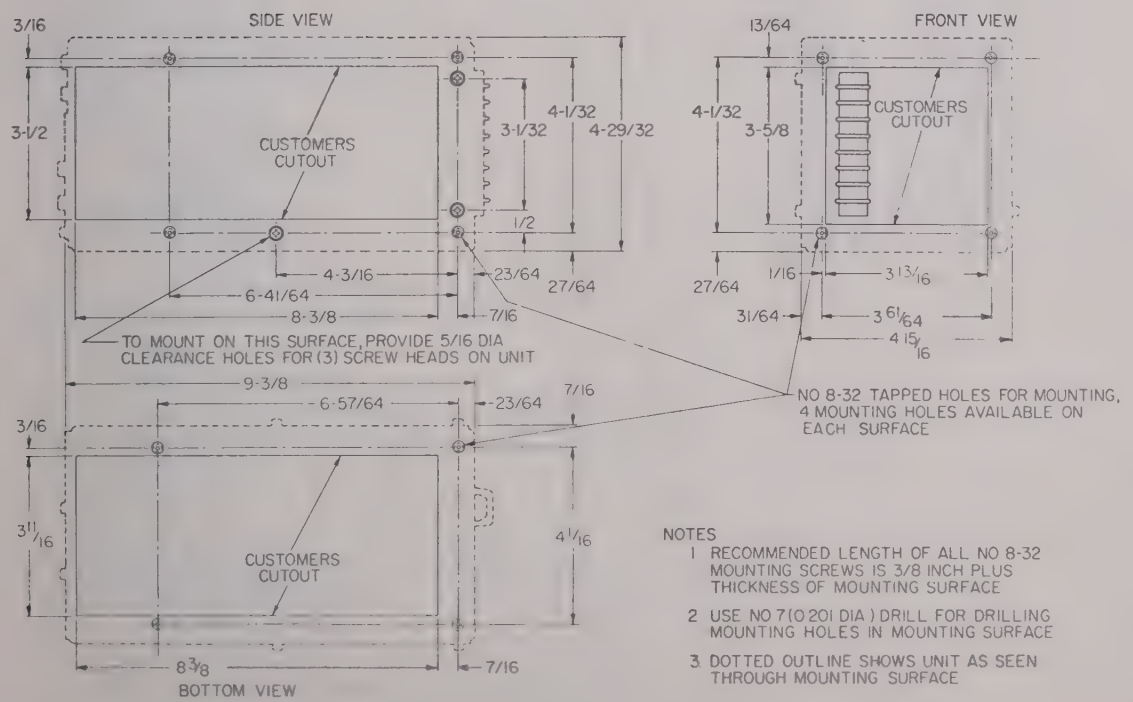
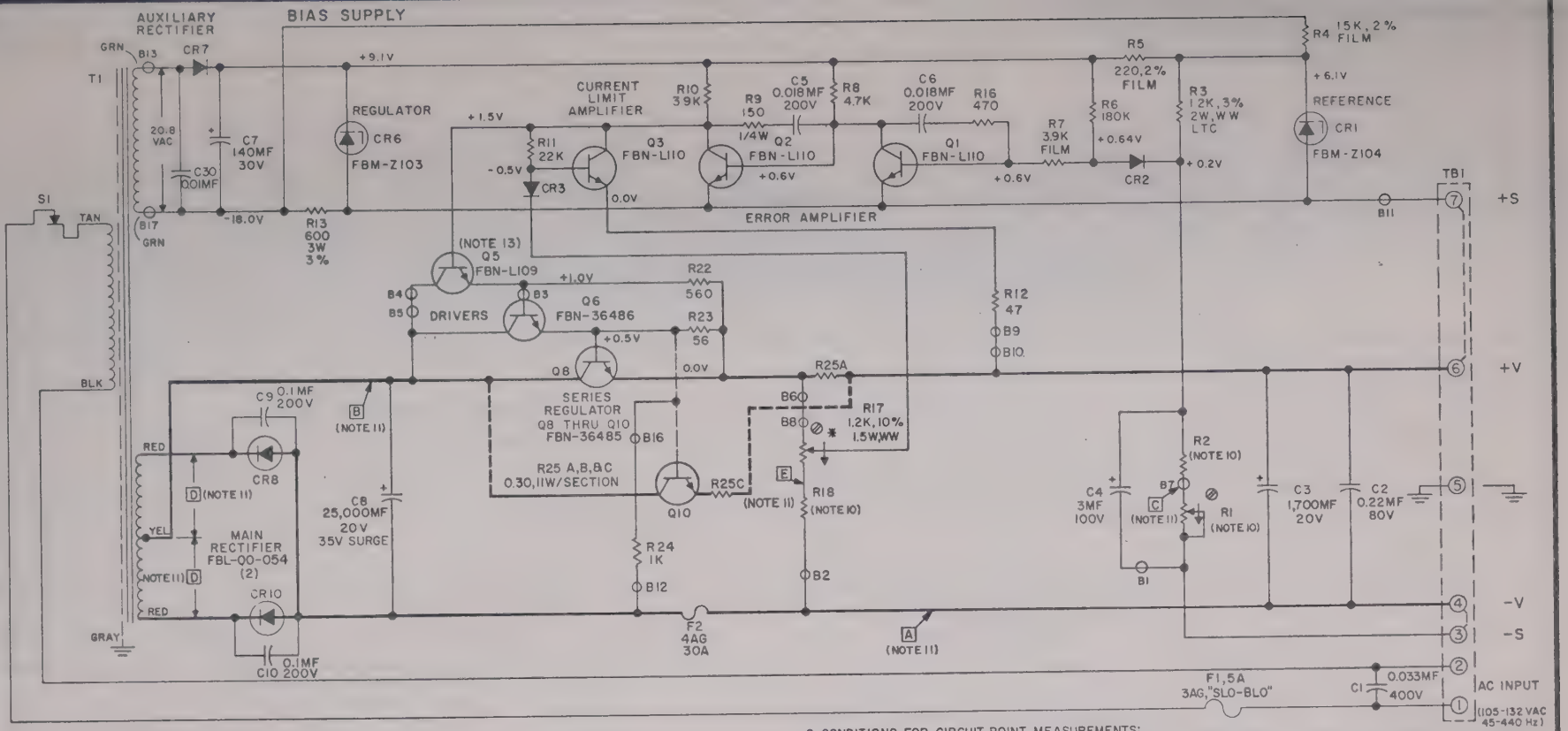


Figure 9. Recommended Mounting Cutouts



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B".
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DERATE CURRENT 10% FOR 45-55Hz OR 360-440Hz.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115VAC, 60Hz ; OUTPUT:NOM'L.VDC NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES
12. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.

REFERENCE DESIGNATIONS NOT USED	
Q4	C11
Q7	C12
	R14
	R15
	R19-21
CR4,5	CR9

MODELS
LM-CC3
LM-CC3P3
LM-CC3P6
LM-CC4P5
LM-CC5
LM-CC6
LM-CC4

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS N'PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A,B

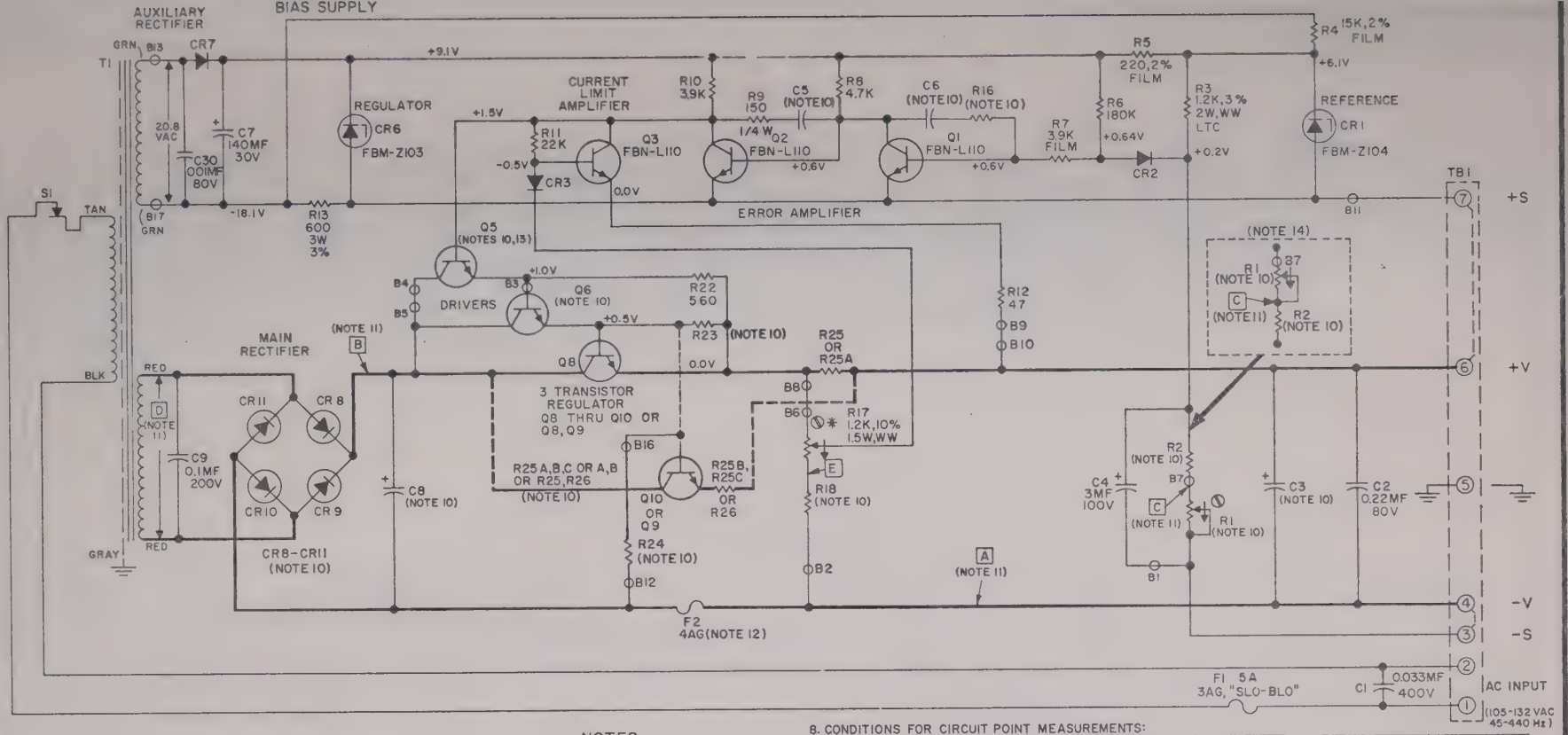
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LAMBDA ELECTRONICS CORP.
MELVILLE NEW YORK

TABLE 1

DATA REFERENCES FOR MODELS LM-CC3 — LM-CC6

Model	Voltage Range (VDC)	Max. Current (Amps)				Schematic Voltage Measurement					Schematic Components		
											R1	R2	R18
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	E (VDC)	±5% 5W	±3%	±5% 1/2W
LM-CC3	3±5%	11.0	9.4	8.2	5.5	-3.0	+10.3	-2.1	9.9	-3.0	300	430 3W	Jumper
LM-CC3P3	3.3±5%	11.0	9.4	8.2	5.5	-3.3	+10.0	-2.1	9.9	-3.3	600	430 3W	Jumper
LM-CC3P6	3.6±5%	11.0	9.4	8.2	5.5	-3.6	+10.7	-2.1	10.3	-3.6	600	430 3W	Jumper
LM-CC4	4±5%	11.0	9.4	8.2	5.5	-4.0	+10.3	-3.0	10.3	-4.0	600	600 3W	Jumper
LM-CC4P5	4.5±5%	10.5	9.0	8.0	5.5	-4.5	+11.8	-3.2	11.8	-3.4	600	650 3W	390
LM-CC5	5±5%	10.5	9.0	8.0	5.5	-5.0	+11.3	-3.2	11.8	-2.4	600	650 3W	1300
LM-CC6	6±5%	9.0	8.4	7.7	5.5	-6.0	-11.3	-4.0	12.8	-2.9	600	800 2W	1300



NOTES

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3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
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   - INDICATES CONNECTION TO CHASSIS.
   - INDICATES ACTUAL UNIT MARKING
   - SEE INSTRUCTION MANUAL.
   - LAMBDA PT. #FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED WIRING BOARD "B"
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DERATE CURRENT 10% FOR 45-55 Hz OR 360-440 Hz
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz ; OUTPUT: NOM'L VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING WAFER WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES.
12. SEE TABLE I FOR FUSE RATING.
13. IF Q5 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
14. ON MODEL LM-CC60, R1 & R2 ARE CONNECTED AS SHOWN.

REFERENCE DESIGNATIONS NOT USED	
Q7	R14
Q4	R15
CR4	R19-R21
CR5	
C10,C11	
C12	

MODELS	MODELS
LM-CC8	LM-CC20
LM-CC10	LM-CC24
LM-CC12	LM-CC28
LM-CC15	LM-CC36
LM-CC18	LM-CC48
	LM-CC60

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A,B

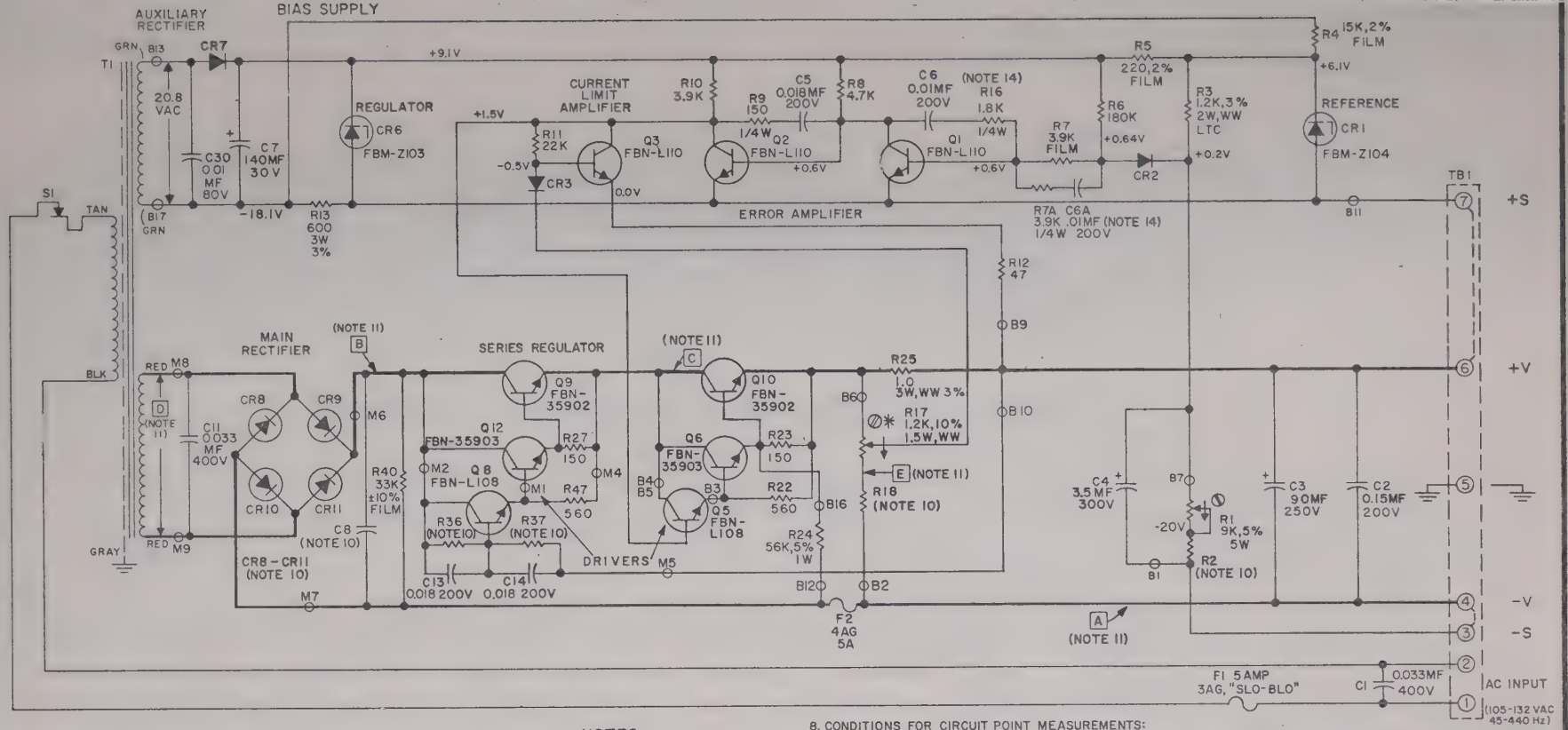
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LAMBDA
ELECTRONICS CORP.
MELVILLE NEW YORK

TABLE 1

DATA REFERENCES FOR MODELS LM-CC8 — LM-CC60

Model	Voltage Range (VDC)	Max. Current (Amps)				Schematic Voltage Measurement					Schematic Components															
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	E (VDC)	C3	C5	C6	C8	CR8-CR11 (FBL 00-)	Q5, (FBN-)	Q6 (FBN-)	Q8-Q10, Q8-Q9 (FBN-)	R1 ±5% 5W	R2 ±3%	R16 10% 1/2W	R18 5% 1/2W	R23 10% 1/2W	R24 10% 1/2W	F2 4AG	R25 A, B, C; R25 A, B, R25, R26
LM-CC8	8±5%	8.5	7.9	7.2	5.5	-8.0	+12.6	-6.0	15.0	-2.6	1700MF 20V 35V Surge	0.018MF 200V	0.018MF 200V	25,000MF, 20V 35V Surge	045 or 054	L109	36486	36485	1.0K	1.2K 2W	470	1.3K	56	1.5K	30A	.30 ± 5%, 11W/ Section
LM-CC10	10±5%	7.5	7.0	6.3	5.0	-10.0	+12.8	-6.0	17.3	-3.3	1700MF 20V 35V Surge	0.018MF 200V	0.018MF 200V	14,000MF, 35V 60V Surge	045 or 054	L109	36486	36485	2.2K	1.2K 2W	470	2.4K	56	1.5K	20A	.30 ± 5%, 11W/ Section
LM-CC12	12±5%	7.3	6.8	5.9	4.7	-12.0	+13.6	-9.0	19.2	-4.0	900MF, 35V 60V Surge	0.018MF 200V	0.018MF 200V	14,000MF, 35V 60V Surge	046 or 054	L109	36486	36485	2.2K	1.8K 3W	470	2.4K	56	3.3K	20A	.30 ± 5%, 11W/ Section
LM-CC15	15±5%	6.0	5.6	5.1	4.3	-15.0	+14.7	-9.0	22.0	-5.0	900MF, 35V 60V Surge	0.018MF 200V	0.01MF 200V	14,000MF, 35V 60V Surge	046 or 054	L109	36486	36485	2.2K	1.8K 3W	1.0K	2.4K	68	3.3K	20A	.47 ± 5%, 8W/ Section
LM-CC18	18±5%	5.5	5.1	4.7	4.1	-18.0	+16.0	-12.5	24.7	-2.7	900MF, 35V 60V Surge	0.018MF 200V	0.01MF 280V	14,000MF, 35V 60V Surge	046 or 054	L109	35469	36220	2.2K	2.5K 3W	1.0K	6.8K	68	3.3K	20A	.47 ± 5%, 8W/ Section
LM-CC20	20±5%	5.0	4.6	4.2	3.6	-20.0	+17.6	-12.5	27.0	-3.6	900MF, 35V 60V Surge	0.018MF 200V	0.018MF 200V	7800MF, 60V 100V Surge	041 or 054	L109	35469	36220	2.2K	2.5K 3W	1.8K	6.8K	68	8.2K	20A	.47 ± 5%, 8W/ Section
LM-CC24	24±5%	4.0	3.7	3.4	3.0	-24.0	+19.0	-18.0	31.6	-3.6	500MF, 60V 100V Surge	0.018MF 200V	0.01MF 200V	7800MF, 60V 100V Surge	041 or 054	L109	36488	36220	2.2K	3.6K 3W	1.0K	6.8K	68	8.2K	20A	.75 ± 5%, 8W/ Section
LM-CC28	28±5%	3.5	3.4	3.1	2.8	-28.0	+20.0	-22.5	35.2	-4.2	500MF, 60V 100V Surge	0.018MF 200V	0.01MF 200V	7800MF, 60V 100V Surge	041 or 054	L109	36488	36487	2.2K	4.5K 3W	1.8K	6.8K	68	8.2K	10A	.75 ± 5%, 8W/ Section
LM-CC36	36±5%	3.0	2.9	2.7	2.4	-36.0	+28.0	-28.0	45.6	-3.9	500MF, 60V 100V Surge	0.018MF 200V	0.01MF 200V	7800MF, 60V 100V Surge	038 or 054	L109	36488	36487	3.3K	5.6K 3W	1.8K	10K	68	15K	10A	.75 ± 5%, 8W/ Section
LM-CC48	48±5%	2.5	2.4	2.2	1.9	-48.0	+30.0	-40.0	56.0	-5.2	200MF, 100V 150V Surge	0.01MF 200V	0.018MF 200V	3000MF, 100V 150V Surge	038 or 054	L108	35903	35902	3.3K	8.0K 3W	1.8K	10K	68	15K	10A	1.0 ± 3%, 3W
LM-CC60	60±5%	2.0	1.9	1.8	1.6	-60.0	+31.0	-10.0	65.5	-4.5	200MF, 100V 150V Surge	0.01MF 200V	0.018MF 200V	3000MF, 100V 150V Surge	038 or 054	L108	35903	35902	4.5K	10.0K 5W	1.8K	15K	68	22K	5A	1.0 ± 3%, 3W



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. RESISTOR WATTAGE 1/2 WATT; RESISTORS ABOVE 2 WATTS ARE WIREWOUND UNLESS OTHERWISE NOTED.
3. RESISTOR TOLERANCES: COMP. ±10%; WIREWOUND ±5%; FILM ±5%; UNLESS OTHERWISE NOTED.
4. CAPACITOR TOLERANCES: ELECTROLYTIC -10%,+100%; MYLAR ±10%; UNLESS OTHERWISE NOTED.
5. SYMBOLS:
   - ↻ INDICATES CLOCKWISE ROTATION OF SHAFT.
   - ⊘ INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - ⏚ INDICATES CONNECTION TO CHASSIS.
   - ▭ INDICATES ACTUAL UNIT MARKING
   - ✳ SEE INSTRUCTION MANUAL.
   - ⊣▶ LAMBDA PT. #FBL-00-030; USE IN 4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - ⊖ INDICATES TERMINAL ON PRINTED WIRING BOARD "B"
6. DESIGNATIONS ARE LAMBDA PART NUMBERS.
7. DERATE CURRENT 10% FOR 45-55 Hz ; FOR 360-440 Hz ; . SEE INSTRUCTION MANUAL.
8. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz ; OUTPUT: NOM'L VDC, NO LOAD INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE DC UNLESS OTHERWISE NOTED. DC MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN +S (TERM. 7) & INDICATED POINTS UNLESS NOTED.
9. COAT BOTH SIDES OF INSULATING MICA WITH DOW CORNING NO. 340 SILICONE GREASE.
10. SEE TABLE I FOR COMPONENT VALUES.
11. SEE TABLE I FOR VOLTAGE VALUES.
12. SEE TABLE I FOR FUSE RATING.
13. IF Q5 OR Q8 IS REPLACED, ALWAYS RETAIN RADIATOR AND INSTALL WITH NEW TRANSISTOR.
14. R16 WAS 1/2W AND R7A C6A NOT USED ON UNITS WITH SERIAL NO. PREFIX A

REFERENCE DESIGNATIONS NOT USED	
Q7, Q11	R14
Q4	R15
CR4	R19-R21
CR5	R30-35
R28	R38,39
C9, C10	R26,29
C12	R41-46
C15-29	

MODELS
LM-CC100
LM-CC120
LM-CC150

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON TB1 INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIXES A,B

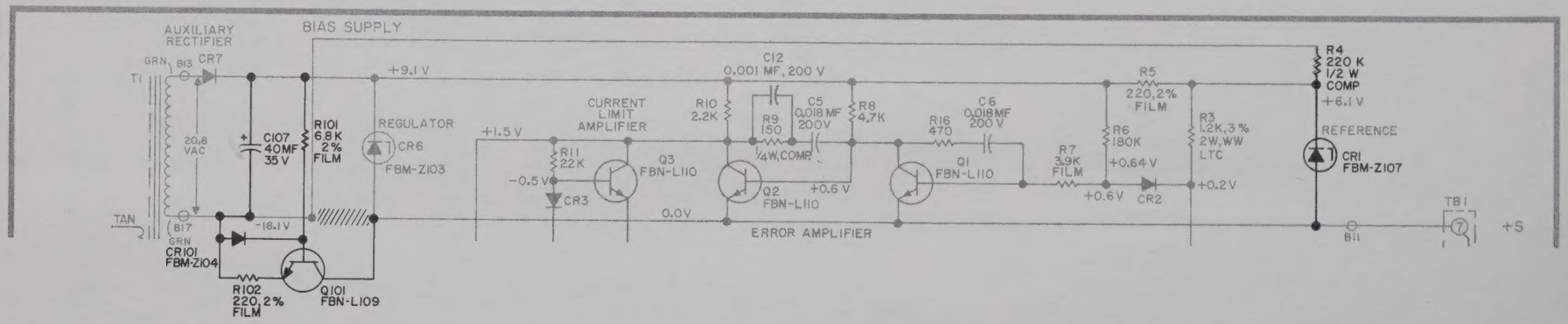
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

LAMBDA ELECTRONICS CORP. MELVILLE NEW YORK
A Veeco SUBSIDIARY

TABLE 1

DATA REFERENCES FOR MODELS LM-CC100, LM-CC120, LM-CC150

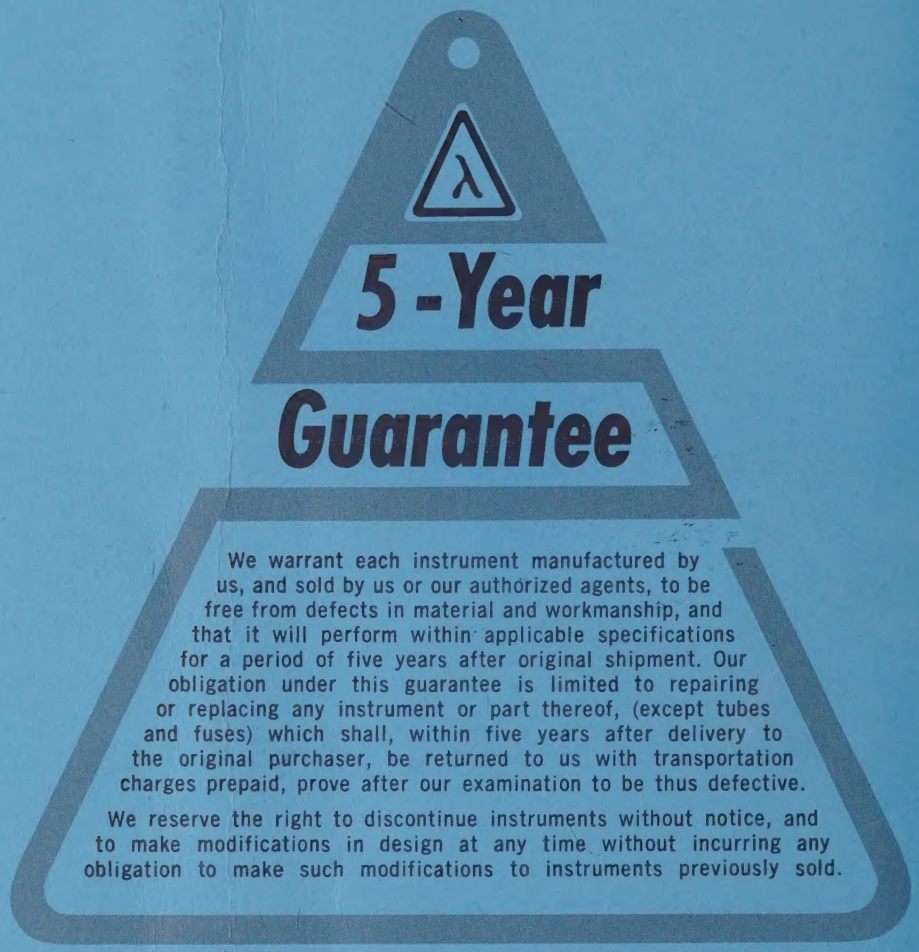
Model	Voltage Range (VDC)	Max. Current (Amps)				Schematic Voltage Measurement					Schematic Components				
		40°C	50°C	60°C	71°C	A (VDC)	B (VDC)	C (VDC)	D (VAC)	E (VDC)	C8	CR8-CR11 (FBL00-)	R2 3% 5W	R18 5% 1/2W	R36, R37 2%, 2W
LM-CC100	100±5%	1.0	0.96	0.90	0.80	-100	+63.5	+28.0	116	-3.0	1500MF 200V	065	16K	39K	24K
LM-CC120	120±5%	0.9	0.86	0.80	0.70	-120	+71.0	+31.0	135	-3.3	1200MF 250V	065	20K	43K	24K
LM-CC150	150±5%	0.7	0.67	0.62	0.55	-150	+80.0	+36.0	166	-3.1	1200MF 250V	066	26K	56K 1W	33K



NOTES:
1. "Y" OPTION COMPONENTS ARE SHOWN IN SOLID BLACK LINE.
2. REFER TO POWER SUPPLY SCHEMATIC DIAGRAM IN THIS MANUAL FOR ALL OTHER COMPONENTS LOCATED ON THE UNIT.
3. FOR "Y" OPTION SCHEMATIC R4 CHANGES VALUE, C7 BECOMES C107 AND CHANGES VALUE; R13 IS DELETED; R101, CR101, R102, Q101 ARE ADDED; CR1 PART NO. CHANGES.

TYPICAL "Y" OPTION SCHEMATIC DIAGRAM

LAMBDA
ELECTRONICS CORP.
MELVILLE NEW YORK



5-Year Guarantee

We warrant each instrument manufactured by us, and sold by us or our authorized agents, to be free from defects in material and workmanship, and that it will perform within applicable specifications for a period of five years after original shipment. Our obligation under this guarantee is limited to repairing or replacing any instrument or part thereof, (except tubes and fuses) which shall, within five years after delivery to the original purchaser, be returned to us with transportation charges prepaid, prove after our examination to be thus defective.

We reserve the right to discontinue instruments without notice, and to make modifications in design at any time without incurring any obligation to make such modifications to instruments previously sold.

LAMBDA ELECTRONICS CORP.

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